

The Nature Conservancy position on SB1212

Senate Natural Resources, Environment and Great Lakes Committee

September 13, 2012

The Nature Conservancy is a leading conservation organization working to protect the most ecologically important lands and waters around the world for nature and people. The Great Lakes are globally significant because they form the largest freshwater ecosystem on earth. Nothing has so fundamentally changed the Great Lakes over time as the introduction of Aquatic Invasive Species (AIS). For over 50 years, the largest source of AIS is through ballast water discharged from oceangoing ships. The economic and environmental toll on the Great Lakes is high and is still growing. The Nature Conservancy is using science to develop new AIS monitoring tools (such as environmental DNA (eDNA)) and new control and management methods to reduce the impacts of AIS and restore native species.

The Nature Conservancy opposes SB1212, as written, because ballast water exchange alone is not adequate to protect the Great Lakes economy and ecosystem from the introduction of additional AIS. Ballast water exchange is highly effective against some species, and it is much better than allowing "raw" ballast water discharges. However, ballast water exchange alone is inadequate based on current science and federal regulations. There are dozens of euryhaline invertebrates (organisms that can tolerate a wide range of salinity) that could survive transport in a ballast tank following ballast water exchange and be a threat to invade the Great Lakes. The Coast Guard has determined that ballast water exchange alone is not adequate and issued regulations with a schedule requiring transoceanic vessels entering the Great Lakes use approved ballast water treatment systems. In addition, the EPA's draft ballast water discharge permit requires ballast water exchange and use of a treatment system.

The Nature Conservancy commissioned the widely respected Anderson Economic Group (AEG) to perform the economic analysis needed to sort through the many claims about the costs associated with AIS. Their report, "The Costs of Aquatic Invasive Species to Great Lakes States" identifies the attributes of meaningful economic analyses and then reviews 19 different economic studies on AIS in the Great Lakes. AEG's report provides a conservative, bottom-line clarification to previously released data and reports that have often conflicted. A copy of the report and a related Detroit Business Crain's article are provided for each committee member.

The conclusion of the report is: "Overall, we find that AIS disrupt economic activity on a large scale in each of the Great Lakes states. AIS impose real costs on industries, consumers, and governments. Costs to individual companies and households include direct expenditures on combating an invasive species or repairing the damage it has done, and include indirect costs such as reduced productivity and higher prices in industries particularly affected by AIS. Governments and private actors such as nonprofits also devote significant resources to addressing AIS. The industries most acutely affected by AIS include sport and commercial fishing, water treatment, power generation, industrial facilities using surface water, and tourism. Together, these industries employ over 125,000 workers in the Great Lakes region.

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Aquatic Invasive Species Cost Businesses Hundreds of Millions Annually

**New Report by Anderson Economic Group Analyzes Economic Impact
of Invasive Species on Businesses in the Great Lakes**

LANSING, Mich. — Aquatic invasive Species (AIS), cost businesses and consumers in the Great Lakes region hundreds of millions of dollars annually in direct costs and even more from indirect costs related to removal, maintenance and management of those species. Meanwhile, state and federal governments are currently forced to spend additional millions as they attempt to control the impacts and prevent the spread of AIS, according to a new report by Anderson Economic Group (AEG), commissioned and released by The Nature Conservancy today.

The industries most affected by AIS include sport and commercial fishing, water treatment, power generation and tourism. Together, these industries employ more than 125,000 workers in the Great Lakes region.

The report details the many ways AIS impose economic costs in the Great Lakes region and it puts into context the scale of the impact on several industries directly affected by AIS. For example, the cost of controlling zebra mussels at one water treatment facility is approximately \$353,000 annually.

“Some may think that \$353,000 doesn’t sound like much in the larger context of business costs, but when you consider that we have 381 water treatment facilities across the basin, those numbers add up quickly,” said Alex Rosaen, consultant at Anderson Economic Group, and the primary author of the report. “That means the region is spending over \$100 million annually on managing a pest infestation we might have been able to prevent.”

The report also outlines how indirect costs are spread across the economy. Primary examples are the cost of government to respond to AIS, and the cost of regulations developed in response to AIS.

"As new AIS invade the Great Lakes, new costs will accrue, additional resources will be used, and new initiatives will be needed," Rosaen said. "Preventing the spread of new AIS into the Great Lakes would benefit each state."

The full report can be found online at nature.org/greatlakes.

The Nature Conservancy is the leading conservation organization working to protect the most ecologically important lands and waters around the world for nature and people. To date, the Conservancy and its 1 million members have been responsible for the protection of more than 120 million acres worldwide. The Nature Conservancy is working to make the Great Lakes watershed among the most effectively managed ecosystems on Earth. For more information, visit <http://nature.org/greatlakes>.

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"All of our leading industries are impacted either directly or indirectly by questions related to water quality," Studley said. "It's clearly an economic issue that should be of concern to employers as well as employees." --- Rich Studley, President & CEO of the Michigan Chamber of Commerce

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Conservancy seeks biz support in fight against invasive species

By Sherri Welch
NOAA



COSTS OF FIGHTING INVASIVE SPECIES

Aquatic invasive species are costing Michigan and other states in the Great Lakes region significantly more than \$100 million each year, according to a report from the East Lansing-based **Anderson Economic Group LLC**, commissioned by **The Nature Conservancy**.

Among the costs cited:

- **\$50 million** in lost revenue due to decreased demand for industry and tourism in the Great Lakes.
- **\$18 million** spent by the **Great Lakes Fishery Commission** to control sea lamprey.
- **\$34 million** spent by the fishery commission on control and research.
- **\$1.2 million** spent each year by a power plant to monitor and control zebra mussels.

- **\$1.97 million** spent by a Lake Michigan paper plant to remove zebra mussels.
- **\$144,000-\$685,000** annual cost for an industrial plant to monitor and control zebra mussels.
- **\$353,000** annual cost of zebra mussel control for a municipal water treatment facility.
- **\$1,040-\$26,000** cost per acre for water milfoil removal for waterfront homeowners.

The Nature Conservancy hopes to elevate the issue of invasive species in the Great Lakes from an environmental concern to a statewide -- and Midwestern -- business concern.

To that end, it commissioned East Lansing-based **Anderson Economic Group LLC** to help tally the economic impact of the issue. Anderson reviewed other studies looking at impact specifics such as average management costs for power plants and the amount the **Great Lakes Fishery Commission** spends on research and controls.

The new report's tally: Invasive species cost significantly more than \$100 million a year to water industry stakeholders. Some believe that figure, while hard to estimate, actually is much larger once costs are extrapolated.

The costs are borne by industrial, utility and municipal organizations that draw water from the lakes for operations and by tourism and fishery industries.

Also included in the estimates are costs to nonprofits working in related areas and homeowners spending money on private abatement.

The report, *The Costs of Aquatic Invasive Species to Great Lakes States*, is available at www.nature.org/greatlakes.

There are multiple reasons the issue is getting more attention.

There are a growing number of species in the Great Lakes -- currently estimated at 186, according to the **Michigan Department of Environmental Quality**. In addition, the lost revenue by companies is becoming a more documented issue, and the **International Joint Commission's** water quality board has decided to focus this year on Lake Erie's invasive species and elevated phosphorus levels.

"We're looking for business to actually engage in the discussion," said Rich Bowman, director of government relations for The Nature Conservancy's Michigan chapter and policy lead for the Great Lakes Project.

"We think there are some opportunities to put in place some programs that reduce the likelihood invasive species would be introduced, to put in place some programs that do early detection and rapid response on a broader basis.

"It's that whole idea of spending a little money to be proactive and to reduce future costs," he said.

Also on The Nature Conservancy's wish list is a coordinated regional approach to the issue.

"That's one of the things we really hope to see in the coming years ... because with some of these problems, you have to coordinate your response," given the connectivity of the waters, Bowman said.

Impacting water-based industries

The industries most acutely affected by aquatic invasive species include sport and commercial fishing, water treatment, power generation, and industrial facilities using surface water and tourism, according to the report. Collectively, these companies employ more than 125,000 workers in the Great Lakes region.

Public utilities, power companies and manufacturers that draw water from the lakes for drinking, cooling and other processes have the largest quantifiable direct costs, Bowman said.

"One of the big impacts is the cost of continuously having to clear their intake pipes of zebra and quagga mussels," he said.

Other invasive species such as phragmites, a reed that can grow to 12 feet or more, are taking over coastal and wetland areas as birds spread the seed from region to region. It can pose a security concern near sites such as DTE Energy Co.'s Fermi nuclear plant -- and a fire hazard when dry in the fall.

"This ultimately becomes a universal problem," Bowman said. "When businesses incur costs, they have to pass that on to their customers."

DTE spends \$500,000 to \$1 million each year on controls and chemicals to combat phragmites near its plants, said CEO Gerry Anderson, who is a trustee of the conservancy's Michigan chapter.

Periodically, the company also has to make capital expenditures at its power plants to combat invasive species, he said. For example, it spent \$2.5 million a couple of years ago to install strainers in front of pumps and other equipment at its Trenton Channel Power Plant in Trenton.

Anderson said he has concerns about invasive species not only because of the toll they take on his company's operations, but also for what they could cost Michigan.

"If there's an asset we should be concerned about for the long-term welfare of the state, it's the Great Lakes" and their importance to the attractiveness of the state for drawing and retaining residents and for tourists, he said.

In addition to lowering waterfront property values and decreasing local tax bases, phragmites hurt the tourism and recreation industries by hampering boating and other water sports, Bowman said.

Non-native species also take a toll on Michigan's fishing industries.

Zebra and quagga mussels eat plankton, starving the small freshwater shrimp that serve as a food source to many small fish. The issue moves up the food chain to larger fish, which die off for lack of food.

The Great Lakes Fishery Commission spends about \$34 million each year on efforts to research and control aquatic invasive species to reduce damage, according to the Anderson report.

Biz offers leadership, funding

The issue of invasive species in the Great Lakes is already a concern for some business leaders. Many serve on conservancy Michigan chapter's board of trustees and/or corporate advisory board.

They include well-known leaders such as DTE's Anderson; Neil Hawkins, vice president, sustainability

and environment, **Dow Chemical Co.**, Midland; Patricia Little, executive vice president and CFO, **Kelly Services**, Troy; James M. Nicholson, vice president, **PVS Chemicals Inc.**, Detroit; Milton Rohwer, president, **Frey Foundation**, Grand Rapids; Alan Steinman, director, **Annis Water Resources Institute**, **Grand Valley State University**; Lloyd Semple, dean, **University of Detroit Mercy School of Law**; and Peter Walters, chairman, **Guardian Industries Corp.**, Auburn Hills.

Some companies are also supporting the conservancy's efforts with grants.

DTE last year awarded the conservancy a \$1 million grant to work on remediation and management of invasive species in the western basin of Lake Erie, from downriver to Toledo and from there along the shoreline to Sandusky, Ohio.

Grand Rapids-based **Meijer Inc.** and its foundation have also provided hundreds of thousands of dollars in grants to help manage baby's breath, a Lake Michigan shoreline invasive species typically found in floral bouquets.

"Half of our stores are in Michigan," said Meijer President Mark Murray. "The Great Lakes define Michigan."

They also provide fish sold in Meijer's stores. The chain sells walleye from the Lake Erie fishery, Murray said, which means it has a personal stake in seeing that Michigan's fisheries are not damaged.

"And we don't want (the fisheries) damaged for sport fishing, either, because that's part of the prosperity for the state," he said. "Retailers want more prosperity because it's good for our business."

From a broader perspective, the health of the Great Lakes and quality of life in Michigan attract new jobs and new business, Murray said.

The issue of invasive species in the Great Lakes is already concerns members of the **Michigan Chamber of Commerce** and local chambers along the state's Great Lakes shorelines, said President and CEO Rich Studley.

Typically, the chamber is wary of new state regulations, but it has supported state regulation of the treatment of ballast waters being released into the Great Lakes, he said.

"All of our leading industries are impacted either directly or indirectly by questions related to water quality," Studley said. "It's clearly an economic issue that should be of concern to employers as well as employees."

State lawmakers act

The Legislature in December passed bills creating a council to update the current invasive species that pose a threat to the Great Lakes and to make recommendations to legislators on the best ways to manage those threats, said Patty Birkholz, director of the DEQ's Office of the Great Lakes. The new council has already met twice.

"It's my opinion ... that aquatic invasive species are a huge threat to the state of Michigan and our economy," she said.

"I don't think everyone gets it, frankly, how at risk we are (and) the harm they are doing to the ecosystem of the Great Lakes. There are not enough solutions to deal with all of the issues we have with aquatic

species right now."

The issue is also garnering increased federal attention.

Through the federal **Great Lakes Restoration Initiative**, the Obama administration is directing significant resources to the issue, Bowman said. It provided \$475 million in 2009 and \$300 million in 2010 and in 2011 for a number of projects. Those include cleanup of contaminated sites such as harbors, management of Asian carp and all invasive species, and programs to reduce polluted runoff, mainly in Lake Erie, and to some extent in Green Bay and Saginaw Bay.

The **International Joint Commission's** water quality board is focusing solely on Lake Erie this year and what appears to be a new dead zone (areas where fish are depleted) created by non-native zebra and quagga mussels and phosphorus runoff from agriculture and sewer systems, said Birkholz, a member of the commission's water quality board.

"We have 20 percent of the world's fresh water," she said. "If we can't drink our water and use our water, we're in big trouble."

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The Costs of Aquatic Invasive Species to Great Lakes States

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Executive Summary

The purpose of this report is to analyze the economic impact of existing Aquatic Invasive Species (AIS) on businesses and households in Great Lakes states. We explore the economic impact of AIS from two perspectives. First, we examine the existing evidence of AIS-related costs to households and businesses. Second, we identify the set of industries most directly affected by AIS in the region and quantify their size.

Overall, we find that AIS disrupt economic activity on a large scale in each of the Great Lakes states. AIS impose real costs on industries, consumers, and governments. Costs to individual companies and households include direct expenditures on combating an invasive species or repairing the damage it has done, and include indirect costs such as reduced productivity and higher prices in industries particularly affected by AIS. Governments and private actors such as non-profits also devote significant resources to addressing AIS. The industries most acutely affected by AIS include sport and commercial fishing, water treatment, power generation, industrial facilities using surface water, and tourism. Together, these industries employ over 125,000 workers in the Great Lakes region.

While comprehensive cost estimates (including all industries, species, and waterways of the Great Lakes region) are not available, there are many individual estimates focusing on part of the problem. These cost estimates range from millions of dollars in cost and lost output for individual large industrial and power facilities to hundreds of dollars annually spent by individual households to control AIS on their property. It is likely that the overall aggregate level of cost to the Great Lakes region is significantly over \$100 million annually.

I. Introduction and Summary of Findings

For as long as there have been ecosystems there have been outside species introduced into them. Sometimes, these new species significantly disrupt the population balance of native species in the ecosystem. The runaway success stories of newly introduced species are often called “invasive species,” though this term is not rigorously defined and is used differently by different people. While there is a case to be made that *any* ecosystem disruption has the potential to cause harm in the future, we consider this definition too broad for this paper. Instead we use another common definition, applying the term “invasive” to introduced species that have harmful effects on things humans find useful, such as logging, recreational boating, or catching commercially valuable fish.¹

This report focuses on *aquatic* invasive species (AIS), which are organisms that affect water-based ecosystems in particular. More specifically, this report is about AIS in the Great Lakes. The first known AIS detected in the Great Lakes was sea lamprey, which arrived in the 1830s and continues to be a problem today.² Since then, over 180 AIS have invaded the Great Lakes, including both plants and animals. Invasive species, including aquatic invasive species, often impose economic damage on businesses and households.

The Great Lakes are interconnected and share the same water. Because of this, if AIS are present in Michigan’s waters they readily spread to New York’s. As a result, there are AIS initiatives underway by both government and private actors, acting at the local, state, and federal levels. Millions of taxpayer dollars at the federal and state levels go toward programs to help prevent and manage AIS problems in the Great Lakes. Businesses and households also act to fight AIS on their own property using their own resources.

PURPOSE

The purpose of this report is to analyze the economic impact of AIS currently present in the region on businesses and households in Great Lakes states.

OVERVIEW OF APPROACH

We explore the economic impact of AIS from two perspectives. First, we examine the existing evidence of AIS-related costs to households and businesses. Second, we identify and quantify the size of the set of industries most directly affected by AIS in the region.

1. This definition is similar to how many use the term “nuisance species.”

2. Sea lamprey are parasites that often prey on commercially significant fish. These organisms are attributed as a major cause of the collapse of lake trout, white fish, and chub populations in the Great Lakes during the 1940s and 1950s.

Reviewing Evidence of AIS-Related Costs

As of this report's release date there were no rigorous studies quantifying the economic impact of all AIS on the entire Great Lakes region.³ Existing studies of costs to households and businesses typically isolate one part of the picture, such as the impact of one species, or the effect on one industry. As a result, we are essentially trying to estimate the size of a forest using detailed studies of individual trees. Our approach is to identify existing high-quality research quantifying costs to businesses and households, then put them into their proper context, noting what types of costs are quantified by existing studies, and what types of costs are not. In the case of expenditures by government and private conservation groups (which are ultimately funded by businesses and households), we were able to identify specific examples of expenditures.

Taken together, this wide range of information makes use of the few specific, credible studies to provide an overall sense of the economic costs of AIS in the Great Lakes region.

Quantifying Size of Industries Most Directly Affected

We quantified the size of the existing industries that are most directly affected by AIS. We identified these industries by noting their presence in studies quantifying the cost of AIS. We then collected data on the size of these industries from several sources, including our own GIS facility, that allowed us to estimate the number of firms and workers in certain industries within a given distance of the Great Lakes. We also relied on other sources such as water quality officials from Great Lakes states that track water use by industrial water users on the region's lakes.

Limitations

The sheer volume of AIS and the variety of costs they impose on households and business prevent all-encompassing estimates of their damage. Existing research quantifying the effects of AIS focuses on a small handful of high-quality studies. There are many costs that we know exist and that impact people and industries, but for which we do not have specific or accurate estimates of their value. Even within the 19 high-quality studies quantifying impacts of AIS in the Great Lakes region, most of the information was aggregated from the same eight original studies.

Another limitation is our ability to identify the specific firms affected by AIS. While our research allowed us to define industries that are most affected, knowing the specific firms that actually incur costs was not within the scope of this project.

3. See "Methodology and Exhibits" on page 30.

SUMMARY OF FINDINGS*1. AIS in the Great Lakes impose economic damage on households and businesses on a large scale.*

Existing research on the economic costs imposed by AIS is sparse. The majority of studies quantify costs based on a handful of high-quality surveys of businesses in specific geographic areas. Despite the dearth of large scale original research, the cost examples that do exist are startling, as shown in Table 1 below.

TABLE 1. Selected Costs Imposed by AIS on Industry and Households

Industry Affected	Cost Examples
All Industries	<ul style="list-style-type: none"> * \$50 million annual cost of reduced demand for industries and tourism in the Great Lakes * \$34 million annual cost of control and research by the Great Lakes Fishery Commission
Sport and Commercial Fishing	<ul style="list-style-type: none"> * \$18 million Great Lakes Fishery Commission sea lamprey control program. * \$3.9 - \$7.1 million annual benefit to anglers in the St. Mary's river system of a sea lamprey control program using sterile male release and lampricide.
Power Generation	<ul style="list-style-type: none"> * \$1.2 million annual cost for one power plant to monitor and control zebra mussels * \$1.7 million annual cost for researching better control methods for zebra mussels
Industrial Facilities	<ul style="list-style-type: none"> * \$1.97 million to remove 400 yd³ of zebra mussels from one Lake Michigan paper plant * \$144,000 - \$685,000 annual cost to monitor zebra mussels at an industrial facility * \$21.6 million budget for AIS control for 2006 St. Lawrence Seaway Development Corp.
Water Treatment	<ul style="list-style-type: none"> * \$480,000 - \$540,000 annual cost of zebra mussel control for water treatment plant * \$353,000 annual cost of zebra mussel control for municipal water treatment facility.
Households	<ul style="list-style-type: none"> * \$355 cost of filtration system installation per lake-shore homeowner * \$1,040 - \$26,000 cost per acre of water milfoil removal

Sources: See Exhibit 2, "Studies Estimating the Direct Costs of Existing Aquatic Invasive Species in the Great Lakes," on page 34 and Exhibit 3, "Studies that Estimate the Total Economic Impact of Existing Aquatic Invasive Species," on page 35.

Analysis: Anderson Economic Group, LLC

Such examples of existing high-quality estimates show that AIS-imposed costs come from many species, affect households and many industries, operate on industry- and region-wide scales, and come in many direct and indirect forms. The costs imposed by AIS now present in the Great Lakes region are clearly large. While we cannot provide a single number for the total cost imposed by AIS, it is likely that the overall aggregate level of cost to the Great Lakes region is significantly over \$100 million annually.⁴

4. This order-of-magnitude estimate is the result of our professional judgement based on the few available large scale cost estimates found in the literature (see Exhibit 3 on page 35) and the size of the industries most affected by AIS (Exhibit 5 on page 47). Also see "Limitations" on page 3 for further discussion of the challenges of providing an aggregate economic cost estimate.

2. We have identified five categories of costs to businesses and households. Existing high-quality studies provide examples in only three of the five categories.

We have identified five main categories in which households and industries face costs due to AIS, including both direct and indirect costs. Table 2 below defines these five categories and reports the number of high-quality studies we found providing examples of each. For government expenditures we contacted federal, state, and local government agencies to compile additional cost data that could not be found in high-quality studies.

TABLE 2. Categories of Costs Imposed By AIS

Cost Category	Definition	Number of Published High-Quality Studies Providing Examples in Cost Category	Additional Data Sources
Direct Operating Costs	Payments made due to AIS infestations that show up on a business's income statement.	8	-
Indirect Operating Costs	High prices for consumers and industries that are a result of other industry's direct operating costs.	0	-
Decreased Productivity Costs	Occurs when an industry cannot perform to its full potential because of an AIS infestation.	0	-
Reduced Demand Costs	Can be caused by AIS when an infestation limits the availability or desirability of an industry's products or services.	1	-
Government Expenditures	Taxpayer dollars used to aide households and businesses with the burden of AIS imposed costs.	3	Expenditure data from Federal, State, and Local Government Agencies

Analysis: Anderson Economic Group, LLC

We discuss the cost categories and the specific studies we examined in detailed exhibits at the end of this paper:

- Exhibit 1, "Description of the Costs of Existing Aquatic Invasive Species in the Great Lakes," on page 33 provides many hypothetical examples of costs affecting businesses and households.
- Exhibit 2, "Studies Estimating the Direct Costs of Existing Aquatic Invasive Species in the Great Lakes," on page 34.
- Exhibit 3, "Studies that Estimate the Total Economic Impact of Existing Aquatic Invasive Species," on page 35 show available quantified cost estimates.

One under-appreciated cost category is government expenditures. There are wide-reaching efforts by public and private actors to manage the costs imposed by AIS. Such activities include AIS species research, engaging

in AIS control and management, and educating the public. Without this hard work other AIS-related costs to industries, households, and governments would likely be higher. Below in Table 3, we show some of the expenditures made specifically to address AIS within each Great Lakes state.⁵

TABLE 3. State Expenditures on AIS Years 2009 and 2010

State	State Funds	Non-Great Lakes Regional Initiative Federal Funds	State Expenditures on AIS ^a
Indiana	\$1,677,166	\$94,725	\$1,771,891
Illinois	\$571,487	\$2,831,961	\$3,403,448
Michigan	\$2,280,000	\$846,250	\$3,126,250
Minnesota	\$7,700,000	\$69,000	\$7,769,000
New York	\$2,206,100	\$34,677	\$2,240,777
Ohio	\$34,668	\$58,064	\$92,732
Pennsylvania	\$284,947	\$70,132	\$355,079
Wisconsin	\$12,000,000	\$70,000	\$12,070,000
TOTALS	\$26,754,368	\$4,074,809	\$30,829,177

Source: Michigan DEQ, New York DEC, U.S. Fish and Wildlife Service

Analysis: Anderson Economic Group, LLC

a. This is not the total amount of money states spent on AIS in 2009 and 2010; we were unable to procure GLRI funding for all states, which would increase AIS related expenditures.

3. The industries which feel the impact of AIS most acutely have a large presence in each Great Lakes state.

While the entire Great Lakes economy is affected in some way either directly or indirectly by AIS there are six main industries that bear the majority of AIS-related costs. To determine these industry categories we noted which types of facilities and operations are most frequently studied in other research and mentioned in discussions of the effects of AIS.

We then grouped these specific instances together into industry categories:⁶

5. Note that the region's aggregate \$30 million total only includes what each state specifically indicates it uses for AIS; is not a comprehensive picture of spending by the states. Many state environmental agencies and departments do not separate out spending for AIS versus other environmental expenditures. For example, the state of New York Bureau of Fisheries estimates that it spends at least 10% of its staff time on AIS related issues, which translates into more than \$350,000 annually.

6. We discuss the methodology used to identify which facilities are likely affected by AIS in "Appendix A: Methodology and Exhibits" on page 30.

Introduction and Summary of Findings

- Sport and commercial fishing
- Power generation
- Industrial facilities
- Shipping-related businesses
- Tourism and recreation
- Public water supply intakes

These industries employ over 125,000 in the Great Lakes. Table 4 below shows the employment, sales volume, water usage, and number of firms and facilities we identified. It also highlights selected examples of the breadth of AIS impacted industries in each Great Lakes state.

TABLE 4. AIS-Affected Industries in Great Lakes States

Great Lakes State	AIS-Affected Industries With Most Facilities In State	Aggregate Estimates for Six Industries Most Affected By AIS ^a			
		Number of Facilities	Employment	Total Sales Volume 2010 (millions of U.S. Dollars)	Annual Great Lakes Water Use ^b (millions of gallons)
Illinois	Tourism, Sport and Commercial Fishing, Power Generation	2,449	30,831	\$8,853	749,365
Indiana	Shipping, Power Generation, Industrial Facilities	616	4,280	\$1,102	702,738
Michigan	Power Generation, Industrial Facilities, Tourism, Sport and Commercial Fishing	3,495	29,381	\$11,987	2,796,731
Minnesota	Sport and Commercial Fishing, Tourism	798	5,136	\$1,259	95,785
New York	Shipping, Power Generation, Sport and Commercial Fishing	2,213	16,454	\$6,755	2,042,281
Ohio	Sport and Commercial Fishing, Power Generation, Tourism	1,759	19,490	\$4,469	985,752
Pennsylvania	Industrial Facilities, Shipping, Tourism	302	2,687	\$989	13,472
Wisconsin	Sport and Commercial Fishing, Tourism, Shipping, Power Generation	1,766	17,502	\$6,532	1,689,170

Note: Employment and firm data from 2010. Water use data from 2008.

Source: ESRI Inc.; Indiana DNR, Michigan DEQ, Minnesota DNR, New York DEC, Ohio DNR, Wisconsin DNR, Great Lakes Commission 2008 Annual Water Use Report

Analysis: Anderson Economic Group, LLC

a. For each group, we used our GIS system with data from ESRI, Inc. to estimate total sales revenues of and employment in the industry. Where available, we used state-collected data on water use for industries that have water intake pipes directly located in the Great Lakes or the Great Lakes watershed.

b. Annual water use includes water used by power generation plants, industrial facilities with intakes directly in the Great Lakes, and public water supply.

For more details see "Costs to Industries and Households" on page 9. For specific locations of businesses affected see Maps 1-6 in "Appendix A: Methodology and Exhibits" on page 30.

4. Costs imposed by existing AIS gives a sense of what could be avoided for possible future infestations by successful prevention efforts.

In addition to managing current efforts to eradicate, control, or adapt to existing AIS, Great Lakes region residents must consider the potential value of efforts to prevent future infestations of AIS that have not yet taken hold. This presents a challenge: no one knows for sure which species will pose the next threat, how it will interact with the existing ecosystem, or how much (if at all) it will disrupt economic activity in the region. The research in this report, though focused on the impact of *existing* AIS, provides important information to the discussion of forward-looking policy. This is because the economic impact of AIS *currently* present in the region shows the scale of the effect AIS can have on the Great Lakes region. Having a sense of the costs AIS are currently imposing, as well as the size of the most vulnerable industries, shows the scale of what is at stake: increased costs, potentially millions of dollars annually, for industries employing thousands of workers across the region.

**ABOUT ANDERSON
ECONOMIC GROUP**

Anderson Economic Group, LLC offers research and consulting in economics, finance, market analysis, and public policy. Since AEG's founding in 1996, the company has helped clients including universities, state and local governments, non-profit organizations, and private and public companies. For more information on the report's authors, please see "Appendix B: About AEG" on page 49.

II. Costs to Industries and Households

AIS imposed costs are not only environmental in nature. Business and households share in the burden created by AIS in the Great Lakes. These costs are high not only because AIS are difficult to manage once an infestation has occurred, but because the Great Lakes are so large and affect such a large economically interconnected region. The water from the Great Lakes provides many cities and towns with fresh drinking water. It is used by industry for manufacturing and for power generation. It is also one of the main attractions for recreational activities in the Great Lakes region.

AIS infestations negatively impact the vital center of the Great Lakes region. AIS impose monetary costs to businesses and households that frequently result in large expenditures that could be avoided if AIS were not present. In this section we describe the breadth of Great Lakes water use by industries and households, define the categories of costs imposed by AIS, and then discuss each affected industry in-depth.

WATER USE IN THE GREAT LAKES

Businesses and households make extensive use of water from the Great Lakes. Power plants along the shoreline of the Great Lakes, their tributaries, and connected in-land lakes use the water to safely produce power for the region. Niagara falls relies on the Great Lakes to supply power to a large part of the Northeastern United States. Industrial facilities use the water for production. Hundreds of municipalities across the region depend on the Great Lakes basin to bring fresh water to their communities. Sport and commercial fishing companies make use of the great bounty of fish in the lakes. The tourism and recreation industries rely on the lakes for customers and sight-seers year-round.

One way to estimate the importance of the water is to measure how much water is used. 18% of the world's fresh surface water and 90% of the fresh water in the United States is found in the Great Lakes. Combined, the Great Lakes hold 5,500 trillion gallons of water.⁷ Many Great Lakes states collect annual data on water use in the Great Lakes basin. Each year, power plants, industrial facilities, and public water suppliers use over 9.1 trillion gallons of water from the Great Lakes basin. Table 5 on page 10 shows water use from each Great Lakes state where such data is collected. Power generation uses by far the most water and the majority of this water is released back into the lakes. The second largest water use category is public water supply consuming more than 1.3 trillion gallons of Great Lakes basin water per year.

7. EPA, Great Lakes Factsheet No.1, <http://www.epa.gov/glnpo/atlas/gl-fact1.html>.

TABLE 5. Annual Water Use in Great Lakes States (millions of gallons)^a

Great Lakes States	Public Water Supply	Power Generation Facilities	Industrial Facilities	Total Water Use
Indiana	5,772	242,535	501,058	749,365
Illinois ^b	348,996	346,615	7,158	702,738
Michigan	285,434	2,415,766	95,531	2,796,731
Minnesota	1,064	83,822	10,899	95,785
New York	394,859	1,646,596	826	2,042,281
Ohio	182,843	752,280	50,629	985,752
Pennsylvania ^c	10,987	-	2,486	13,472
Wisconsin ^d	109,015	1,221,323	358,832	1,689,170
Total	1,338,939	6,708,937	1,027,419	9,075,294

Data: Indiana DNR, Michigan DEQ, Minnesota DNR, New York DEC, Ohio DNR, Wisconsin DNR, Great Lakes Commission 2008 Annual Water Use Report

Analysis: Anderson Economic Group, LLC

- a. All data are 2009 or 2010 use collected by state DNR or DEQ unless otherwise noted.
- b. Illinois data are from 2008 collected by the Great Lakes Commission
- c. Pennsylvania data are from 2008 collected by the Great Lakes Commission
- d. Wisconsin public water supply use data are 2008 values collected by the Great Lakes Commission. Power generation use data are 2008 data and industrial facility data are from 2010 collected by the Wisconsin DNR.

Water used by the sport and commercial fishing industry as well as tourism and recreation-based businesses is hard to estimate. Both of these industries rely on the existence of the Great Lakes. Sport and commercial fishing rely on the bounty that the lakes support, and tourism and recreation use all aspects of the water and surrounded land. It would be impossible to estimate their use in gallons however we can estimate how large each industry is and what types of costs they face because of AIS. In the next section we will discuss the different categories of costs that AIS impose on businesses and households. After a discussion of cost categories we describe in depth how AIS affect each of the above mentioned industries.

CATEGORIES OF AIS-CREATED COSTS TO INDUSTRY AND HOUSEHOLDS

Costs imposed by AIS are diverse. Some costs are directly measurable while others are more difficult to estimate even though we know they exist. Exhibit 1, "Description of the Costs of Existing Aquatic Invasive Species in the Great Lakes," on page 33 gives a detailed list of cost examples by industry. This exhibit shows possible costs that businesses and households must bear because of AIS. These costs can take the following forms:

- **Direct Operating Costs.** AIS cause costs requiring regular, direct expenditures by companies and households. These costs can take the form of having to take maintenance-type actions, perform routine procedures to comply with current laws, and fixing damaged infrastructure. Examples of these actions may include industrial facilities scraping mollusks off of water intake and irrigation pipes, ships changing how they exchange ballast water, and purchasing chemicals to treat AIS. There is an additional sub-category of operating costs that must also be considered: indirect operating costs. An indirect operating cost occurs when an industry has a direct cost due to AIS and a portion of that cost is pushed onto consumers. This increases the customer's operating costs. For example, when power generation becomes costly energy prices rise across the board, or when a particular fish species is low in supply the cost to purchase that fish at the market increases.
- **Decreased Productivity.** In addition to the expenditures needed to deal directly with AIS, productivity overall can be affected in several ways. For example, commercial fisheries may have lower productivity if fish stocks are affected by competition from an invasive species that is not as valuable a catch. Pipeline systems at water treatment plants or energy generation plants can become clogged reducing their output level and production abilities. Other productivity costs include decreased revenue and profits because production is low due to time away from general operations cleaning pipes, reprocessing fouled water, or repairing infrastructure damages.
- **Reduced Demand.** Reduced demand can come in many forms. In some cases, industries may have fewer customers than they otherwise would due to AIS. The demand for their products or the demand to enter the industry in general is lower than what it otherwise would be if AIS were not a problem. Examples include sport fishing companies affected by fish stocks competing with AIS where the catch of fish is simply not large enough to attract customers, and tourism and hospitality industries affected by changes to scenery and water use due to an invasive plant. Also impacted, but less easy to quantify are those not entering a business at all because there simply is not a large enough market due to AIS infestations. Worst off are businesses forced to close because of AIS. A beach that is chronically covered with rotting algae and dead fish or a lake that is unusable due to aquatic weeds could cause a business reliant on tourism to see a reduction in demand that threatens its viability.

We provide more examples of costs to industries in Exhibit 1, "Description of the Costs of Existing Aquatic Invasive Species in the Great Lakes," on page 33. These focus on the industries identified and discussed in the next section, "Industries likely to be affected by AIS" on page 12.

In the following section we discuss each industry affected by AIS and the costs that each bear. Where possible, we give monetary examples of costs to industry due to AIS. Exhibit 2, "Studies Estimating the Direct Costs of Existing Aquatic Invasive Species in the Great Lakes," on page 34 shows the high-quality examples we found in existing research.

**INDUSTRIES LIKELY
TO BE AFFECTED BY
AIS**

We describe some examples of how AIS affects the Great Lakes in "Categories of AIS-Created Costs to Industry and Households" on page 10 and this section individually discusses each impacted entity. This is important because each industry that is affected by AIS infestations has different costs and repercussions. The industries we identify are not only those directly located on or using the Great Lakes. The entire Great Lakes basin is affected. We will discuss each affected industry as defined by our research, discuss specific ways in which the industry is affected, and give a monetary example of costs that have been estimated to date.

Sport and Commercial Fishing

The sport and commercial fishing industry is of great importance to the Great Lakes region. As the largest body of fresh water in the world the Great Lakes is home to many species of fish and other aquatic beings that are of high economic value. This industry stretches widely across the Great Lakes region. Even though fisheries and the lakes themselves are in confined areas, many companies manufacture equipment, which sport fishers may purchase all across the Great Lakes states. Not only are the sport fishing companies and fisheries affected by AIS infestations directly, but manufacturers and retailers supplying the industry are also impacted.

Fisheries in the Great Lakes have experienced multiple fish population crashes since the first invasive species, sea lamprey, was first found in the 1830s in Lake Ontario.⁸ Since then, many once prominent and economically valuable fish have completely disappeared or have declined in population. Lake trout, sturgeon, and lake herring are three examples. Lake trout can now only naturally spawn in Lake Superior, while in the past they were prevalent in all Great Lakes. Two other economically important species of fish, blue pike, and Lake Ontario Atlantic salmon, are now believed to be extinct due to lack of food and competition with other predator fish.⁹

Other species of economically valuable fish have replaced those that have become extinct. Nevertheless, in the past century, fish harvests have declined in the Great Lakes. Fish catches once measured at 147 million pounds per year in the late 1800s. Since the 1950s they now weigh in at 110 million pounds annually, a significant decline.¹⁰ This is over a period in which fish catches should have increased due to both increased demand, as the (human) population has grown, and improved technology

8. Indiana Department of Natural Resources, *History of Lake Michigan Fisheries*, Michigan City, Indiana.

9. EPA. The Great Lakes: Environmental Atlas and Resource Book. epa.gov/glnpo/atlas, 2011

10. EPA. The Great Lakes: Environmental Atlas and Resource Book. epa.gov/glnpo/atlas, 2011

that should enable larger catches. The declining catches are thought to be due to a combination of over-fishing, declining food at key points on the food chain, and the presence of AIS.

The sport and commercial fishing industry as a whole employs over ten thousand people in the Great Lakes and brings in revenues of \$3.4 billion each year. See Map 1, "Identified Great Lakes U.S. Sport and Commercial Fishing Related Businesses," on page 41 for the locations of businesses affected by AIS in the Great Lakes region.¹¹ AIS affect fishing directly by competing with native species for food and space. If a non-native invasive species reproduces quickly and has no predators, for example asian carp, they are more likely to compete with and deplete the stock of economically valuable native species. For the fishing industry the direct effect of lower fishing stocks is the greatest cost to bear. The industry is also affected by other AIS, such as mollusks and aquatic weeds. Zebra mussels must be scraped off of boats and docks and aquatic weeds can cause shallow waters to become impassable to boats and clog engines.

Sea lamprey is a nuisance to fisherman and have been around since they were first found in the 1830s. They are an eel-like creature that prey on fish by attaching themselves like a leech. They severely reduce the fish population and there have been efforts from releasing sterile-male sea lamprey into the lakes to poisoning the waters where they dwell. As a result, many control measures are taken (typically by or coordinated through the Great Lakes Fishery Commission) to reduce the population. Chemicals and other substances are applied to the water to keep fish populations safe.

One way to estimate the cost of lower fish stocks is the benefit received from efforts to keep them higher through controlling AIS. An econometric study of three types of sea lamprey control measures in the St. Mary's River estimated the benefits to anglers to be between \$3.9 million and \$7.1 million each year in the St Mary's River. Another study estimates the benefits of controlling European Ruffe between \$146.4 million and \$1.3 billion annually.¹² Additional estimates of costs to the sport and commer-

11. Note that a portion of Pennsylvania and New York have been excluded from this analysis while the complete state areas of the six other Great Lakes states are included. This is because residents and businesses in these two states have access to the ocean and the Great Lakes. In an attempt to isolate industry within the Great Lakes region, we excluded portions of each of these states that have closer access to the ocean versus the Great Lakes. This certainly may exclude some activities of residents and commerce among businesses within the Great Lakes that happen to reside in the areas not included. Due to these factors, our estimates for total employment and revenues should be considered very conservative.

12. For Sea Lamprey estimates see Lupi, Hoehn, and Christie 2003. For European Ruffe estimates see Leigh 1998. For this and all further citations of specific papers, see full citations in Exhibit 3 on page 35.

cial fishing industry can be found in Exhibit 2, "Studies Estimating the Direct Costs of Existing Aquatic Invasive Species in the Great Lakes," on page 34.

Power Generation

Power generation seems like an unlikely industry to be affected directly by AIS, however many power generation facilities have water intake pipes required for production that sit in the Great Lakes. Power generation is the largest user of Great Lakes water in the region. Almost 7 trillion gallons of water are used annually by the power generation industry. These plants provide energy to millions of residents through coal, natural gas, petroleum, hydroelectric, and nuclear power. Water is used for cooling in each plant's operations and is necessary for safety. Water is also used for actual power generation at places such as Niagara Falls which provides power to a large portion of the Northeast United States.

As shown in Map 2, "Available Locations of U.S. Power Generation Facilities in the Great Lakes Watershed," on page 42, there are more than 100 power plants located directly on the lakes. For safe operations and effective cooling techniques, these plants must have water pipelines clear of obstructions. Mollusks, for example asian clams and zebra mussels, colonize any solid mass in waters they infest. Often, pipelines for power plants become clogged due to these invasive creatures.

The most direct cost to the power industry comes from controlling and monitoring mollusks that attach themselves to water intake pipes. Infestations of mollusks can clog intake pipes causing power generation facilities to stop production in order to clean the pipes before operations continue. Zebra mussels, for example, have become such a problem for power generation that in 1989 the Detroit Edison plant in Monroe, Michigan, the largest fossil-fuel plant in the world, had to shut down operations for three days to clean their pipes, which cut off power to the surrounding area.¹³

One group of researchers surveyed power plants in Ontario and found that each plant spends approximately \$1.2 million each year for monitoring and controlling zebra mussels. Approximately \$1.7 million is spent by the industry each year on research for more effective methods of controlling and monitoring zebra mussels.¹⁴

13. See Park, H. and Hushak, L. 1999.

14. For costs to the power generation industry due to zebra mussels, see Colautti et al. 2004.

Industrial Facilities Including Shipping

Many industrial facilities are affected by AIS. These facilities include but are not limited to manufacturing plants with water intake pipes, manufacturers of ships and shipping supplies, and industrial shipping and vessel transport companies. The shipping industry alone employs approximately 8,660 people throughout the Great Lakes states and generates revenues of over \$1.7 billion annually. For the locations of shipping-related businesses, see Map 3, "Identified U.S. Shipping Industry Business Locations in Great Lakes States," on page 43.

The industrial base in the Great Lakes relies heavily on the water. The steel industry has a large presence in the area because of the natural resources available such as iron ore, coal, and limestone. The lakes are used to transport the ore and other materials from the northern part of Michigan down to processing facilities in lower Michigan and Ohio. Shipping is also a large economic driver in the Great Lakes that relies on the water. Grain is transported on the lakes along with iron ore, coal, and limestone. Economic decline and other factors have reduced the Great Lakes shipping fleet that once numbered over 3,000 vessels.¹⁵

Industrial facilities that have water intake pipes located in the Great Lakes use over one trillion gallons of water annually. These facilities are likely affected by AIS infestations because of their proximity to the lakes and likelihood of having water intake pipes in the Great Lakes and Great Lakes basin. They face similar issues as power generation plants, such as removing mollusks from their pipes. For the locations of businesses that have intakes in the Great Lakes basin, see Map 4, "Available Locations of U.S. Industrial Facilities in the Great Lakes Watershed," on page 44.

The specific cost examples we found for industrial facilities are generally for zebra mussels because their affects tend to be the most visible. It was reported to the U.S. Geological Survey in 1997 that a paper company on Lake Michigan had spent \$1.97 million removing 400 cubic yards of zebra mussels from its structures. Other researchers who surveyed water using facilities in the Great Lakes found that for zebra mussel monitoring and control, each year the average medium sized industrial facility spent around \$144,000 and the average large facility spent almost \$700,000. Other costs such as re-outfitting plants and re-building infrastructure have not yet been measured but they too represent large costs to industry. For a full listing of cost estimates to industrial facilities see Exhibit 2, "Studies Estimating the Direct Costs of Existing Aquatic Invasive Species in the Great Lakes," on page 34.

15. EPA, The Great Lakes: Environmental Atlas and Resource Book, epa.gov/glnpo/atlas, 2011

Other types of costs incurred by these industries, which are difficult to quantify may be in the form of reduced demand or decreased productivity. Ship productivity, for example, may be slowed down by zebra mussels and other mollusks. Mollusks attach themselves to a ship (this is called fouling) which causes the ship to move more slowly in the water. Another cost to the shipping industry are regulations, which are meant to prevent the spread of AIS. Companies are expected to take time to stay up to date on changing legislation and implement any necessary compliance measures, which we further discuss in "Costs of AIS Regulation" on page 24.

Tourism and Recreation

The largest industry that is affected by AIS in the Great Lakes is tourism and recreation. The counties that border the Great Lakes shores, which are home to many recreational sites and attractions for tourists, employ 90,000 people and have revenues of \$30.3 billion per year.¹⁶ Tourism-related businesses within only a half-mile of the Great Lakes shoreline generated about \$800,000 in annual revenues and employ almost 6,000 people.¹⁷ See Map 5, "Identified U.S. Tourism-Related Sites, Organizations, and Businesses near the Great Lakes," on page 45.

AIS imposes multiple costs onto the tourism and recreation industry. They range from actual monitoring and control costs, to lost revenues from tourists not coming to the lakeshore because of aquatic weeds and fouled beaches. The latter hitting restaurant and retail businesses that rely on lake-bound tourists each year the hardest.

There are some interesting affects of AIS. For example, while zebra mussels and other mollusks clean water and make it clearer, this encourages weed growth. These weeds often wash up on the shores of Great Lakes beaches along with dead mussel shells rendering the beaches very unpleasant and almost unusable. Rotting seaweed is very difficult to remove from beaches as well. Unfortunately, there are not many estimates of monetary costs available for this industry. Two that do exist focus solely on water millfoil removal. It can cost around \$26,000 for the required equipment and between \$1,040 and \$26,000 for the actual removal.¹⁸ Other major costs have yet to be estimated despite the economic importance of this industry.

16. Estimate is based on AEG identified entities. See Map 5, "Identified U.S. Tourism-Related Sites, Organizations, and Businesses near the Great Lakes," in Appendix for locations of tourism-related entities.

17. Estimate is based on AEG identified entities. See Map 5, "Identified U.S. Tourism-Related Sites, Organizations, and Businesses near the Great Lakes," in Appendix for locations of tourism-related entities.

18. See Zhang and Boyle 2010.

Water Treatment

The Great Lakes are the largest bodies of fresh water in the world and one of the most important natural resources to the eight surrounding states, which is why water treatment is such an important industry to the region. Almost 400 municipalities use Great Lakes water for their public water supply taking in over 1.3 trillion gallons each year. Map 5, "Industries in Great Lakes States," on page 47 shows the locations of municipalities that rely on the Great Lakes basin for their water supply.

The costs to public water facilities affect both governments and businesses. Many municipalities locate water treatment plants and intakes on the Great Lakes, as do private water companies. The city of Windsor, Ontario spends between \$480,000 and \$540,000 per year on direct maintenance due to zebra mussels.¹⁹ Another estimate places the cost of controlling quagga mussels at \$4,650 for an infested facility each year.²⁰ Additional cost estimates can be found in Exhibit 2, "Studies Estimating the Direct Costs of Existing Aquatic Invasive Species in the Great Lakes," on page 34.

The costs incurred by water treatment are similar to that for power generation and industrial facilities. Similar to ship fouling, water pipes can also become fouled by mollusks.²¹ This creates the need for more removal, development of control technology, and more frequent water purification than would otherwise be necessary.

Households

Households bear many costs associated with AIS presence and infestation in the Great Lakes. Households are affected by AIS in multiple ways, but in general, because they are not production oriented businesses, household costs fall into two categories; indirect operating costs and reduced demand. The most prevalent problems for households with lake-front property are milfoil and mollusks. Examples of indirect operating costs include waterfront property residents needing to physically remove weeds or mollusks from their shoreline. For example, in Ontario, lakefront cottage owners have spent \$355 per cottage to install a filtration system to combat the presence of quagga mussels.²² Additional indirect costs include increased household water and energy costs, which are being passed along from water treatment and energy plants that are affected by the presence of AIS.

19. See Colautti et al. 2004.

20. Ibid.

21. When mollusks attach themselves to the hull of a ship or inside of a pipe, this is called "fouling."

22. Ibid. Quagga mussels have similar effects as zebra mussels.

Lakefront property may experience a decline in demand due to AIS infestations, such as aquatic weeds, which make beaches aesthetically unappealing or unusable. These same weeds can make swimming difficult and create areas that are impassable by motor boats. Removing invasive weeds, such as milfoil can range from \$1,040-\$26,000.²³ All of these factors can contribute to a decline in property values for these types of households.

Aggregated Cost Estimates

Few researchers have attempted to come up with aggregate cost estimates for the affects of AIS. These range from government budget appropriations to aggregations of research on damages due to AIS infestations. For example, in 1999, the state of Michigan appropriated \$4.22 million specifically for controlling AIS, but this was only a portion of the nearly \$6 million in appropriations for invasive species in general.²⁴

The U.S. Fish and Wildlife Service recently collected data from each Great Lakes State on state and federal expenditures on AIS in each Great Lakes state between 2009 and 2010. Exhibit 6, "Government Expenditures on AIS Control, Monitoring, and Prevention in Great Lakes States," on page 48 shows these estimates. Other studies show that costs are much higher than what the government budget states. A 1999 survey of Great Lakes water users estimates the control costs of zebra mussels at about \$40.5 million annually.²⁵ The Great Lakes Fishery Commission has spent approximately \$34 million each year on research and control of AIS. Another study in 2004 reports that Great Lakes businesses suffer \$50 million every year in losses and reduced demand simply due to mollusks and sea lamprey.²⁶

See Exhibit 3, "Studies that Estimate the Total Economic Impact of Existing Aquatic Invasive Species," on page 35 for details on studies that attempt to aggregate costs. For a complete list of referenced studies as well as those we examined but chose not to use see Exhibit 4, "Aggregated List of Consulted Cost Research Studies," on page 36.

For the full report, go to www.nature.org/greatlakes

23. Cost estimate for milfoil involve the actual per-acre removal charges as well as the necessary equipment. See Zhang and Boyle 2010.

24. See U. S. GAO 2000.

25. See Park and Hushak 1999.

26. See Colautti et al. 2004.



ALLIANCE FOR THE GREAT LAKES

ENSURING A LIVING RESOURCE FOR ALL GENERATIONS

Opposition Testimony of Joel Brammeier, President & CEO

SB 1212

Senate Committee on Natural Resources, Environment and Great Lakes

September 13, 2012

Submitted In Writing

Introduction

Good morning Chairman Casperson, ranking Minority Member Warren, Senator Green and Members of the Committee. My name is Joel Brammeier and I serve as President and CEO for the Alliance for the Great Lakes – the oldest regional Great Lakes citizens' organization, with offices in Grand Haven, Detroit, Cleveland, Buffalo, Milwaukee and Chicago. I am most thankful for the opportunity to speak to you today and am sure you appreciate the importance of protecting the Great Lakes from aquatic invasive species (AIS) spread by ballast water from ocean-going vessels.

The Alliance has a long history of working with Michigan leaders, lawmakers and regulators to support laws and rules designed to protect the quality of life and economic opportunity afforded to Michiganders by the state's vast natural resources, from dune habitats to the seemingly endless supply of fresh water. We testified strongly in favor of Michigan's 2005 Senate bill 332 to establish the state ballast water technology program and participated actively in subsequent rulemaking. Most recently, I was appointed to

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the Michigan Aquatic Invasive Species Advisory Council to advise the state on implementation of its invasive species prevention and control effort.

Background

Prevention of new invasions from ballast water should be nonpartisan, deliberate and executed with the utmost urgency. Many policy makers understand the economic and environmental value of protecting the largest source of fresh surface water on the planet from biological pollution like zebra mussels.

There are a number of vectors that bring AIS into the Great Lakes. Ballast water discharges are, by far, the most serious and damaging pathway. Nearly 70% of the AIS in the Great Lakes have entered in the cargo holds of oceangoing vessels since the opening of the St. Lawrence Seaway. In fact, ballast water has been responsible for some of the most devastating Great Lakes invasions. The zebra and quagga mussels vacuum up food that would otherwise support valuable sportfish and have led to collapses of economically essential fish stocks. Round gobies feast on the eggs and fry of native fish and disrupt essential habitat. Utilities and industry spend millions of dollars to control mussels that stick to and foul intake pipes. A recent University of Notre Dame study found that these species are costing the Great Lakes region at least \$200 million annually. The damage and costs never end – once a species has successfully invaded Michigan waters it is here permanently.

Recognizing a lack of leadership by the Federal government, in 2005 the Michigan legislature passed a bill to reduce the spread of AIS through the discharge of ballast water from ocean-going ships. Michigan held true to its name as the Great Lakes state and put forward a permitting program intended to partially resolve the persistent ballast water discharge problem.

Michigan has been one of a few states to both recognize and act on the fact that the costs of preventing future invasions should be borne not by taxpayers, but by the businesses who desire to make a commitment to sustainable shipping in the Great Lakes. The billions of dollars of losses incurred by zebra and quagga mussel invasions – not to mention the other 184 invaders established in the Great Lakes – have been paid by every Michigan citizen who uses the Great Lakes or any of the rivers and lakes that form a vast freshwater resource and playground across this great state.

Michigan's choice to prioritize this most serious vector of invasion made and makes good sense, even as the state and the Great Lakes region work on solutions for other vectors such as the Chicago Waterway System. 7 years later, federal approaches to preventing new invasions of species via ballast water remain inadequate. Both the U.S. Coast Guard and the U.S. Environmental Protection Agency have chosen to follow the lead of the International Maritime Organization and fail to set a ballast water standard that will actually protect the Great Lakes from new invasions. Michigan should not depend solely on these federal agencies to protect its sovereign water resources.

SB 1212 unfortunately rolls back years of solid work devoted to protecting Michigan's fish, wildlife and commerce in its outdoor resources and we must strenuously oppose the bill. Fish and wildlife are a solid and critical leg in the stool supporting Michigan's economy. At the time of passage of the 2005 law, not a single Michigan port was welcoming ocean ships that wanted to discharge polluted ballast water into our Great Lakes. Prior to the law going into effect, the number of direct overseas exports was a very small amount of the overall traffic from Michigan ports (e.g. oceangoing vessels, both imports and exports, account for less than 2% of all traffic from 2000-2009).

Weakening ballast water standards will not gain Michigan an economic advantage. Instead, this will only hurt the long-term economic growth of tourism directly corresponding to improving fish and wildlife resources.

The current law provides a clear and fair process for shippers to either install an approved invasion prevention technology or apply to have a technology of choice certified by the state. As has occurred repeatedly through the history of environmental protection in the United States, technology will evolve accordingly based on the demands of ecosystem protection. If Michigan fails to uphold its commitment to preventing invasions, we will be condemning a first-rate natural resource to protection by second-rate technologies.

Conclusion

Please consider the long-term impact of weakening the protection of a critical source of economic growth and environmental health in the state of Michigan – the Great Lakes – and the continued failure of our federal agencies to provide fully protective standards to prevent new invasions. For these reasons and all those stated above, we oppose SB 1212.

Once again, allow me to extend my sincere thanks to Chairman Casperson, Ranking Member Warren, Senator Green and members of the Committee for your deliberations on this matter. If you have any questions or concerns regarding this testimony, please do not hesitate to contact me at (312) 939-0838 x 224, or at jbrammeier@greatlakes.org. Thank you.